(19) Eur päisches Patentamt
European Patent Office
Office européen dès brevets

(11) EP 0 939 034 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
01.09.1999 Bulletin 1999/35

(51) Int. Cl.[6]: **B65B 61/18**, B65B 9/06

(21) Application number: **99300365.6**

(22) Date of filing: **19.01.1999**

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: **28.01.1998 US 14906**

(71) Applicant:
ILLINOIS TOOL WORKS INC.
Glenview, Illinois 60025 (US)

(72) Inventors:
- **Malin, Art**
  Northbrook, Illinois 60062 (US)
- **Johnson, Joel L.**
  Stockbridge, Georgia 30281 (US)

(74) Representative:
Rackham, Stephen Neil
GILL JENNINGS & EVERY,
Broadgate House,
7 Eldon Street
London EC2M 7LH (GB)

(54) Horizontal form-fill-and-seal machine

(57) In a horizontal form-fill-and-seal (FFS) machine, a continuous length of packaging film (12) is folded lengthwise over the consumer products to be packaged. The lateral edges (34,36) of the packaging film (12) are separately and independently aligned with one another by edge sensing and control devices (42,44). A zipper (38) is fed between the aligned lateral edges (34,36) of the packaging film (12). The lateral edges (34,36) are sealed to one another, and the zipper (38) sealed to the folded packaging film (12), by a pair of sealing sections (60,62;80,82), each of which includes a pair of parallel sealing devices. Side seals are produced by conventional means (64,66), which also separate completed packages from one another.

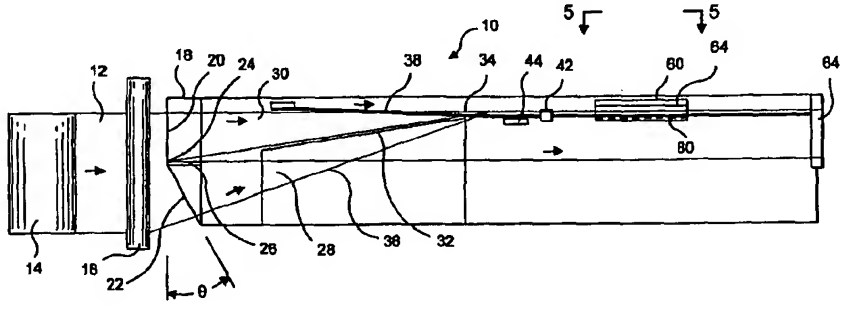

FIG. 1

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Description

[0001] The present invention relates to reclosable plastic bags of the type in which perishable food products and other goods are packaged for sale to consumers in retail outlets. More specifically, the present invention relates to reclosable plastic bags which are concurrently manufactured and filled with a consumer product on a horizontal form-fill-and-seal (FFS) machine, wherein a plastic interlocking zipper for each bag is disposed longitudinally relative to the direction of motion of the thermoplastic sheet material used to form the reclosable bags on the FFS machine.

[0002] The present invention relates to improvements in the package-making art and may be practiced in the manufacture of thermoplastic bags and packages of the kind that may be used for various consumer products, but which are particularly useful for food products which must be kept in moisture- and air-tight packages, free from leakage until initially opened for access to the product contents, which packages are then reclosable by zipper means to protect any remainder of the product therein.

[0003] The indicated art is fairly well-developed, but nevertheless remains open to improvements contributing to increased efficiency and cost effectiveness.

[0004] The present invention relates more particularly to the production of reclosable plastic bags which are concurrently manufactured and filled with a consumer product on a horizontal FFS machine. In this regard, US-A-4,589,145 shows a method of and apparatus for packaging a block-shaped product, such as cheese, into a wrapped envelope package, with material especially adapted for said packaging, wherein a bottom face of the product article is engaged on a panel area of the wrapper sheet, which sheet has extended portions that are wrapped about the article and sealed across the top face of the article. One of the portions of the wrapper sheet has a reclosable zipper and a web portion alongside the zipper which is adapted to be severed or ruptured to provide a mouth opening for access to the article within the package, the mouth opening being reclosable by the enclosed zipper. The zipper may be provided with structure to prevent its being pulled open during the wrapping and sealing of the wrapper about the article. The web portion may have guidance for severing or rupturing the same when access into the package is desired.

[0005] In US-A-4,876,842, another method of and apparatus for packaging product masses in an FFS machine, wherein a continuous length of packaging film is joined in running relation by a continuous length of separately formed plastic reclosable fastener assembly having interlock profile strips spot-sealed together at package-length intervals, are shown. The co-running fastener strip ass mbly and the packaging film are oriented so that th spot seals of the strip are located in alignment with the spaces between the product masses on the film to ensure that the fastener strip assembly will be cross-sealed at the spot seals when the film is cross sealed between the product masses to provide individual packages. The orienting may be effected by an indexing arrangement including sensor response to index marks on the film and the fastener assembly.

[0006] The present method and apparatus are improvements over those disclosed in these prior-art U.S. patents.

[0007] Accordingly, the present invention is a horizontal form-fill-and-seal (FFS) machine for packaging consumer products. The horizontal FFS machine comprises means, such as a supply roll, for providing a continuous length of packaging film having two lateral edges for use in packaging the products, and means for placing the consumer products to be packaged at intervals along one half of the continuous length of packaging film.

[0008] The horizontal FFS machine also includes means for folding the continuous length of packaging film continuously down the center thereof and over upon the consumer products, and means for aligning the lateral edges of the folded continuous length of packaging film with one another. Means for feeding a zipper between the aligned lateral edges of the packaging film are also included.

[0009] A zipper sealing section includes means for sealing the aligned lateral edges of the continuous length of packaging film to one another, and means for sealing the zipper within the folded packaging film.

[0010] Means for sealing the folded packaging film at intervals between the consumer products to create individual packages, and for separating the individual packages from one another, are also a part of the machine.

[0011] A particular embodiment will now be described with reference to the accompanying drawings; in which:-

Figure 1 is a top schematic plan view of the horizontal FFS machine of the present invention;
Figure 2 is a side schematic plan view of the machine;
Figure 3 is a front view of a steerable guide wheel of the horizontal FFS machine;
Figure 4 is a side view of the wheel;
Figure 5 is a cross-sectional view taken as indicated by line 5-5 in Figure 1; and
Figure 6 is a cross-sectional view taken as indicated by line 6-6 in Figure 5.

[0012] Referring to Figures 1 and 2, which are top and side schematic plan views, respectively, of a horizontal FFS machine 10, a continuous length of packaging film 12, which may comprise polyethylene, is dispensed from a supply roll 14 downward under a guide roll 16 and upward toward a fold-forming member 18.

[0013] The fold-forming member 18 includes a first fold-forming edge 20, which is in a direction transvers to the running direction of the packaging film 12, and a

second fold-forming edge 22, which makes an oblique angle, θ, between 15° and 30° with respect the direction of the first fold-forming edge 20. Angle θ is between 15° and 30° to properly control the lateral movement of the film 12 and to minimize the length of the machine 10. The apex 24 formed where the first fold-forming edge 20 meets the second fold-forming edge 22 coincides, more or less, with the center of the packaging film 12, which is continuously folded lengthwise down the middle by the horizontal FFS machine 10. Passage of the packaging film 12 over the apex 24 begins the folding process.

[0014] Disposed on the fold-forming member 18 in a direction perpendicular thereto is a wedge-shaped member 26. The wedge-shaped member 26 essentially raises the portion 28 of the packaging film 12 being folded over upward relative to the portion 30 lying flat on the horizontal FFS machine 10. This is done so that a consumer product to be packaged may be placed on the portion 30 on or near the fold-forming member 18, and eventually be covered by the portion 28 being folded over.

[0015] A folding guide 32 is disposed downstream from the fold-forming member 18 and at an oblique angle relative to the running direction of the packaging film 12. The folding guide 32 continuously folds portion 28 of the packaging film 12 over onto portion 30, so that, ultimately, the two lateral edges 34,36 of the packaging film 12 may align with one another, and the packaging film 12 itself may be C-folded continuously in a lengthwise direction.

[0016] A zipper 38, comprising a male zipper profile interlocked with a female zipper profile and of a variety well-known to those of ordinary skill in the art, is continuously fed and guided between the two overlapped lateral edges 34,36 of the packaging film 12 from a supply reel 40.

[0017] Downstream from the point where the two lateral edges 34,36 first overlap one another, are two edge sensing and control devices. In a preferred embodiment, each edge sensing and control device comprises a photo cell 42 and a steerable guide wheel 44, one edge sensing and control device being provided each of the two lateral edges 34,36. The photo cells 42 accurately sense the locations of the two lateral edges 34,36, and, if there is any departure from the desired location of either of the two lateral edges, signal their respective steerable guide wheels 44 to correct the location.

[0018] Figures 3 and 4 are front and side views, respectively, of a steerable guide wheel 44. Wheel 44 rotates about a horizontal axis 46, as packaging film 12, clamped between tire 48 and surface 50, moves downstream on the horizontal FFS machine 10. When either of photo cells 42 senses a discrepancy in the desired location of one of the two lateral edges 34,36, cylinder 52, acting upon arm 54, turns the wh el 44 about a vertical axis to move th lateral edge 34,36 in question toward or away from upright member 58.

[0019] Downstream from the two edge sensing and control devices are an upper sealing section 60 and a lower sealing section 62. Both of the upper and lower sealing sections 60,62, as shown in Figures 5 and 6, include an edge sealing section and a zipper sealing section aligned in parallel with one another. The sealing sections may be of the type typically used in the prior art. For example, edge sealing sections 64,66 may include stationary heating bars 68,70 surrounded by belts 72,74, respectively, of Kapton- or Teflon-coated steel running with the film 12 passing through the edge sealing sections 64,66 to prevent the film from sticking to the stationary heating bars 68,70. Likewise, zipper sealing sections 80,82 may include stationary heating bars 84,86 surrounded by belts 88,90, respectively.

[0020] The upper and lower sealing sections 60,62 may also be provided with a suitable stationary device 92 to accurately guide and position the zipper 38 between the upper and lower zipper sealing sections 80,82.

[0021] Finally, further downstream from the upper sealing section 60 and the lower sealing section 62 on the horizontal FFS machine 10 are upper and lower side seal and cut-off jaws 64,66 which separate one package from the next in the usual manner.

Claims

1. A horizontal form-fill-and seal (FFS) machine for packaging consumer products, said horizontal FFS machine comprising:

   means for providing a continuous length of packaging film (12) having two lateral edges (34,36);
   means for placing said consumer products to be packaged at intervals along one half of said continuous length of packaging film (12);
   means for folding (20,22,32) said continuous length of packaging film (12) continuously down the center thereof and over upon said consumer products;
   a device (42,44) for aligning said lateral edges (34,36) of said folded continuous length of packaging film (12) with one another;
   means for feeding a zipper (38) between said aligned lateral edges (34,36) of said folded continuous length of packaging film (12);
   means for sealing (68,70) said aligned lateral edges (32,34) of said folded continuous length of packaging film (12) to one another;
   means (84,86) for sealing said zipper (38) to said folded continuous length of packaging film (12);
   means (64) for sealing said folded continuous length f packaging film crosswise at intervals b tween said consumer products to create individual packages; and

means (66) for separating said individual packages from one another.

2. A horizontal FFS machine as claimed in claim 1, wherein said means for folding comprises:

a fold-forming member having a first fold-forming edge (20) and a second fold-forming edge (22), said second fold-forming edge (22) being oriented at an oblique angle relative to said first fold-forming edge (20) and forming an apex (24) therewithin
a wedge-shaped member (26) aligned in the running direction of said continuous length of packaging film (12) with said apex (24), said wedged-shaped member (26) raising one half of said continuous length of packaging film (12) for folding over upon said one half having said consumer products; and
a folding guide (32), said folding guide (32) being disposed at an oblique angle with respect to the running direction of said continuous length of packaging film (12) and being adapted to fold said raised one half of said continuous length of packaging film continuously over upon said other half.

3. A horizontal FFS machine as claimed in claim 2 wherein said second fold-forming edge (22) of said fold-forming member is oriented at an oblique angle between 15° and 30° relative to said first fold-forming edge (20).

4. A horizontal FFS machine as claimed in any preceding claim, wherein said means for feeding a zipper (38) comprises a supply reel (40) adapted to feed said zipper (38) between said aligned lateral edges (34,36) of said folded continuous length of packaging film (12) from a side thereof.

5. A horizontal FFS machine as claimed in any preceding claim, wherein said device for aligning said lateral edges of said folded continuous length of packaging film with one another includes an edge sensing and control device (44) for each lateral edge (34,36), each of said edge sensing and control devices (44) comprising a sensing device (42) and a steerable guide wheel (44) coupled therewith, said sensing device (42) being adapted to detect said lateral edge (34,36) and to signal said steerable guide wheel (44) to correct the position of said lateral edge (34,36) when said lateral edge (34,36) is not in a proper location.

6. A horizontal FFS machine as claimed in claim 5, wherein said device for aligning said lateral edges includes a photo-optical edge sensing device (42).

7. A horizontal FFS machine as claimed in any preceding claim 1, wherein said means for sealing said aligned lateral edges (34,36) of said folded continuous length of packaging film to one another and said means for sealing (68,70) said zipper to said folded continuous length of packaging film include a sealing section for each lateral edge (34,36), each of said sealing sections comprising a pair of parallel sealing devices, one of said sealing devices (64,66) being adapted to seal said aligned lateral edges together and the other of said sealing devices (80,82) being adapted to seal said zipper to said packaging film.

8. A horizontal FFS machine as claimed in any preceding claim, wherein said means for sealing said folded continuous length of packaging film crosswise to create individual packages and said means for separating said individual packages from one another are a pair of upper and lower side seal and cut-off jaws (64,66).

9. A method for packaging consumer products on a horizontal form-fill-and-seal machine comprising:

providing a continuous length of packaging film (12) having two lateral edges (34,36);
placing said consumer products to be packaged at intervals along one half of said continuous length of packaging film (12);
folding said continuous length of packaging film continuously down the center thereof and over upon said consumer products;
aligning said lateral edges (34,36) of said folded continuous length of packaging film with one another;
feeding a zipper (38) between said aligned lateral edges (34,36) of said folded continuous length of packaging film (12);
sealing said aligned lateral edges (34,36) of said folded continuous length of packaging film (12) to one another;
sealing said zipper (38) to said folded continuous length of packaging film (12);
sealing said folded continuous length of packaging film (12) crosswise at intervals between said consumer products to create individual packages; and,
separating said individual packages from one another.

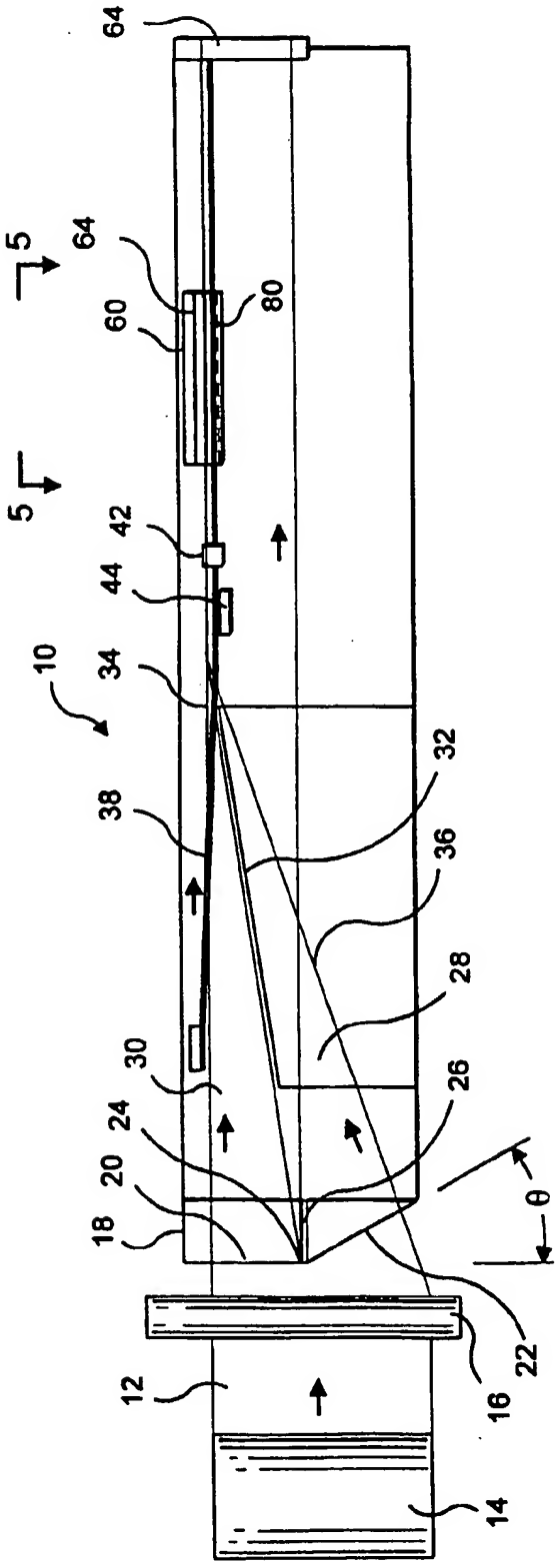

FIG. 1

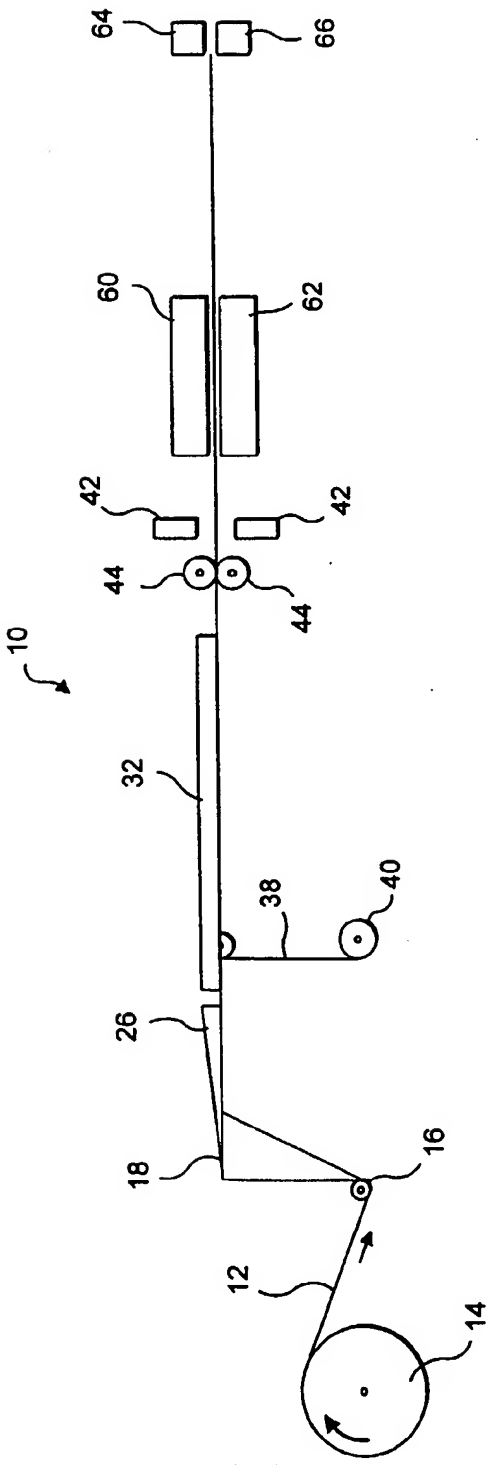

FIG. 2

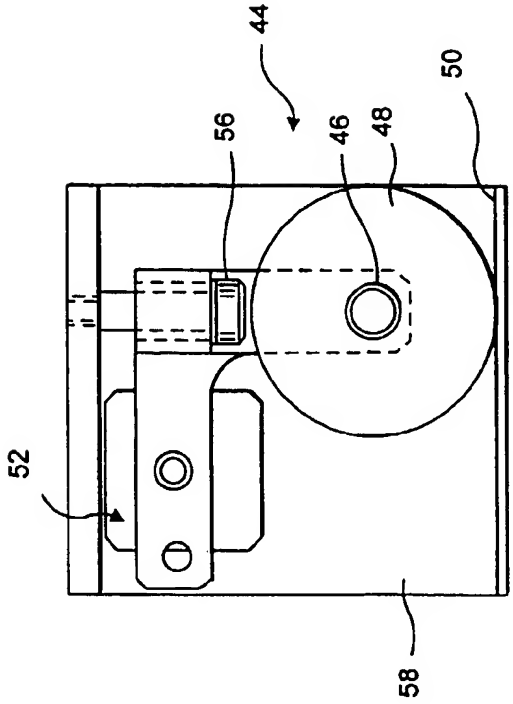

FIG. 4

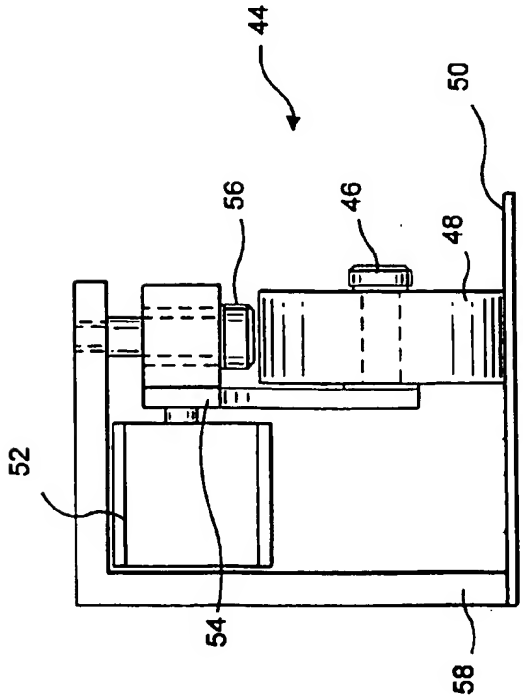

FIG. 3

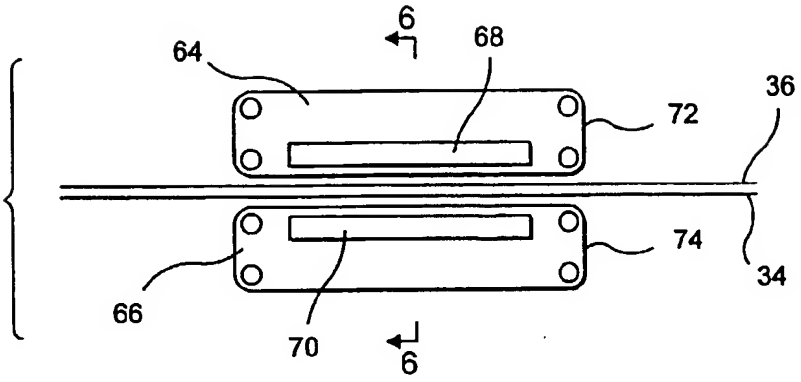

FIG. 5

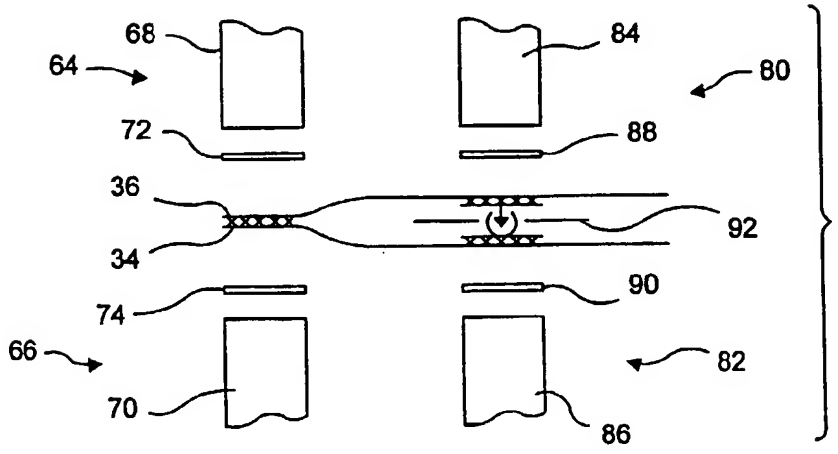

FIG. 6

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 99 30 0365

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A	DE 27 35 889 A (ILSEMANN) 15 February 1979 * page 11, line 30 - page 13, paragraph 2; figure 1 * * page 15, paragraph 2 - paragraph 4 *	1,9	B65B61/18 B65B9/06
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A	US 3 587 958 A (TAYLOR) 28 June 1971 * abstract; figures 1,5,6 *	1,9	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

B65B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	29 April 1999	Claeys, H

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